

What is claimed is:

1. A method for improving the nutritional quality of a fibrous by-product or residue of a food manufacturing process, comprising:
5 inoculating the fibrous by-product or residue with at least one filamentous fungus; and
 fermenting the fibrous by-product or residue;
 whereby a dry matter content of the by-product or residue decreases, a protein content of the by-product or residue increases, and a
10 fat content of the by-product or residue decreases.
2. The method of Claim 1, wherein the filamentous fungus is selected from the group consisting of Rhizopus, Aspergillus, Trichoderma, and any combination thereof.
3. The method of Claim 1, wherein the fibrous by-product or residue is selected from the group consisting of spent brewer's grains, dried distiller's grains, dried distiller's solubles, distiller's dried grains with
5 solubles, residues of the cereal processing industry, wheat bran, soybean hulls, citrus pulp, beet pulp, rice husks or hulls, bagasse, apple pommace, and mixtures thereof.
4. The method of Claim 1, wherein a dry matter content of the

fibrous byproduct or residue is decreased by from about 7% to about 12%, a protein content of the fibrous byproduct or residue is increased by from about 10% to about 15%, and a fat content of the fibrous byproduct or residue is decreased by from about 40% to about 50%.

5. The method of Claim 1, wherein fermentation is a solid-state fermentation using the fibrous byproduct or residue as a substrate for growth of the filamentous fungus.

6. A method for producing an animal feed and an enzyme-based animal feed supplement from a fibrous by-product or residue of a food manufacturing process, comprising:

inoculating the fibrous by-product or residue with at least one
5 filamentous fungus;

fermenting the fibrous by-product or residue whereby a dry matter content of the by-product or residue decreases, a protein content of the by-product or residue increases, and a fat content of the by-product or residue decreases;

10 separating at least one enzyme from the fermented fibrous by-product or residue; and

providing the fermented fibrous by-product or residue and optionally the separated enzyme to an animal as a feed or feed supplement.

7. The method of Claim 6, wherein the fibrous by-product or residue is selected from the group consisting of spent brewer's grains, dried distiller's grains, dried distiller's solubles, distiller's dried grains with solubles, residues of the cereal processing industry, wheat bran, soybean
5 hulls, citrus pulp, beet pulp, rice husks or hulls, bagasse, apple pommace, and mixtures thereof.

8. The method of Claim 6, wherein the filamentous fungus is selected from the group consisting of *Rhizopus*, *Aspergillus*, *Trichoderma*, and any combination thereof.

9. The method of Claim 6, wherein the separated enzyme is of fungal origin.

10. The method of Claim 9, wherein the enzyme is a fungal protease.

11. The method of Claim 6, wherein a dry matter content of the fibrous byproduct or residue is decreased by from about 7% to about 12%, a protein content of the fibrous byproduct or residue is increased by from
5 about 10% to about 15%, and a fat content of the fibrous byproduct or residue is decreased by from about 40% to about 50%.

12. The method of Claim 6, wherein fermentation is a solid-state fermentation using the fibrous byproduct or residue as a substrate for growth of the filamentous fungus.

13. An enzyme-containing animal feed or feed supplement, produced by the steps of:

- inoculating a fibrous byproduct or residue of a food
- 5 manufacturing process with at least one filamentous fungus; and
- fermenting the fibrous byproduct or residue whereby a dry matter content of the byproduct or residue decreases, a protein content of the byproduct or residue increases, a fat content of the byproduct or residue decreases, and at least one enzyme of fungal origin is introduced into the
- 10 fermented byproduct or residue.

14. A method for improving body weight gain rate of a growing animal, comprising feeding a nutritionally effective amount of an enzyme-based animal feed supplement formulated by the steps of:

- 5 inoculating a fibrous byproduct or residue of a food
- manufacturing process with at least one filamentous fungus;
- fermenting the fibrous byproduct or residue whereby a dry matter content of the byproduct or residue decreases, a protein content of the byproduct or residue increases, and a fat content of the byproduct or

- 10 residue decreases;
 separating at least one enzyme from the fermented fibrous
byproduct or residue;
 dewatering the separated enzyme; and
 providing the dewatered enzyme to an animal in a
15 formulation including a suitable carrier.

15. The method of Claim 14, wherein the fibrous byproduct or residue is selected from the group consisting of spent brewer's grains, dried distiller's grains, dried distiller's solubles, distiller's dried grains with
5 solubles, residues of the cereal processing industry, wheat bran, soybean hulls, citrus pulp, beet pulp, rice husks or hulls, bagasse, apple pommace, and mixtures thereof.

16. The method of Claim 14, wherein the filamentous fungus is selected from the group consisting of *Rhizopus*, *Aspergillus*, *Trichoderma*, and any combination thereof.

17. The method of Claim 14, wherein the separated enzyme is of
10 fungal origin.

18. The method of Claim 17, wherein the enzyme is a fungal protease.

19. The method of Claim 14, wherein the animal is selected from the group consisting of an avian, a bovine, a porcine, an equine, an ovine, a caprine, a canine, and a feline.

20. The method of Claim 14, wherein a dry matter content of the fibrous byproduct or residue is decreased by from about 7% to about 12%, a protein content of the fibrous byproduct or residue is increased by from
5 about 10% to about 15%, and a fat content of the fibrous byproduct or residue is decreased by from about 40% to about 50%.

21. The method of Claim 14, wherein fermentation is a solid-state fermentation using the fibrous byproduct or residue as a substrate for growth of the filamentous fungus.